INCH-POUND

MIL–P–50884D
AMENDMENT 1
13 September 2002

MILITARY SPECIFICATION

PRINTED WIRING BOARD, FLEXIBLE OR RIGID–FLEX
GENERAL SPECIFICATION FOR

Inactive for new design after 28 February 1999.
For new design use MIL–PRF–31032.

This amendment forms a part of MIL–P–50884D, dated 28 December 2000, is approved for use by all Departments and Agencies of the Department of Defense.

The attached insertable replacement pages listed below are replacements for stipulated pages. When the new pages have been entered in the document, insert the amendment as the cover sheet to the specification.

Replacement page	Page replaced
29	29
30	30

PAGE 8

A.2.1.1: Delete “IPC–100101 – Capability Test Board (Single Sided), Master Drawing.” and “IPC–100102 – Capability Test Board (Double Sided), Master Drawing.”

PAGE 14

A.3.6.6.3, delete “.003 inch (0.08 mm)” and substitute “.020 inch (0.51 mm)”.

PAGE 16

TABLE I, thickness column: Add “in inches” after “Thickness”.

PAGE 18

A.3.7.4.3, last sentence, delete “A.3.5.3.2.1” and substitute “A.3.5.3.2”.

PAGE 19

A.3.7.4.4.1, delete and substitute:

“A.3.7.4.4.1 Qualification and periodic testing. Two specimens shall be tested. The number of fold cycles shall be 25 cycles in both directions; center of the test specimen, orthogonal to the longest length. The mandrel size for types 1 and 2 shall be twelve times the sum of the total ply thickness reduced to the nearest .125 inch (3.18 mm). The mandrel size for types 3, 4, and 5 shall be twenty–four times the sum of the total ply thickness reduced to the nearest .125 inch (3.18 mm). The mandrel shall not be less than .125 inch (3.18 mm)”.

PAGE 22

A.4.5.2.1a: Delete “or IPC–100101”.

A.4.5.2.1b: Delete “or IPC–100102”.

PAGE 25

TABLE II, inspection column, electrical, continuity, notes column: Add “10/”.

TABLE II, inspection column, electrical, circuit shorts, test specimen columns T1, T2, T3, T4 and T5: Delete “E–1” and substitute “E–3” (5 places).

TABLE II: Add:

“10/ When continuity verification is performed manually, the current shall be not in excess of 1.5 amperes and the time of application shall not exceed 30 seconds.”

PAGE 28

A.4.6.2.2b, delete and substitute:

“b. Solderabilty (see A.3.7.4.7): For printed wiring board using only surface mount components, the surface solderability test can be used in lieu of the hole solderability test. For mixed component designs (both surface mount and through hole attachment), unless otherwise specified, only the hole solderability test shall be performed.

“(1) For SERA, samples shall be selected in accordance with appendix E.

“(2) For J–STD–003 class 3, the samples shall be selected in accordance with table IV and appendix C, table VIII, series L.”

A.4.6.2.2c, delete and substitute:

“c. Thermal stress (see A.3.7.4.10).

“(1) Types 1, 2 and 5: The number of test coupons to be microsectioned shall be based on a statistical sample of panels in the lot in accordance with appendix C, table VIII, series L.

“(2) Types 3 and 4: A minimum of one A test coupon per panel shall be microsectioned and inspected. Additional B test coupons shall be microsectioned based on a statistical sample of panels in the lot in accordance with appendix C, table VIII, series J.”

PAGE 31

TABLE V, rework simulation, test coupon by type columns (type 1 through type 5): Delete “B” and substitute "5/" (5 places).

TABLE V: Add:

“5/ “The holes to be tested and inspected shall represent component holes used for through–hole mounting.”

PAGE 32

TABLE VI, flexibility endurance (class B), test specimen column: Delete “F” and substitute "X".

PAGE 34

A.4.8.2.2.1, delete the last sentence.

PAGE 36

A.4.8.4.3, third sentence, delete “test coupon F” and substitute “test coupon X”.

A.4.8.4.6.3, delete in its entirety.

PAGE 40

A.6.3, third line: After “IPC–FC–241”, add “(superseded by IPC–4202, IPC–4203 and IPC–4204)”. Fourth line: Delete “(now MIL–S–13949)” and substitute “(canceled without replacement)”. Fifth line: Delete “MIL–S–13949” and substitute “MIL–P–13949”.

PAGE 45

B.4.1c, delete and substitute:

“c. Complexity. The QPL/QML manufacturer can supply QPL compliant printed wiring boards greater than their qualified QML capability (similar to the traditional QPL product assurance level). Printed board designs verified using the QPL/QML option shall flow through the conversion of customer requirements element of the approved Quality Management (QM) plan as described in MIL–PRF–31032, Appendix A. The Technical Review Board (TRB) shall evaluate designs exceeding their current QML–31032 qualification listing to determine if the add–on qualification provisions of MIL–PRF–31032 shall be used. Reasons for not using the add–on qualification provisions shall be documented in the periodic status reports.”

PAGE 48

C.3.1b(2), end of sentence, add “based on the number of panels in the lot”.

PAGE 49

C.4.3, delete and substitute:

“C.4.3 Tightened inspection (for reevaluation purposes). Tightened inspection shall be performed by sampling using double the sample size as specified in table VII with zero failures allowed or 100 percent.”

Custodians:
Army – CR
Navy – EC
Air Force – 11
DLA – CC

Review activities:
Army – AR, MI
Navy – AS, CG, MC, OS, SH, TD
Air Force – 16, 99

Preparing activity:
DLA – CC

(Project 5998–0125)

TABLE IV. Group A inspection.

Inspection	Requirement Paragraph	Method Paragraph	Test specimen 1/					Sample plans 2/
			T1	T2	T3	T4	T5	
Visual and dimensional								
Acceptability 3/ 4/	A.3.7.1	A.4.8.1	PWB	PWB	PWB	PWB	PWB	Plan BH 3/ 4/
Registration (method I)	A.3.5.6	A.4.8.1.2	5/	5/				Plan TJ see 6/
Microsection								
As received	A.3.7.2.1	A.4.8.2		B	B	B		See 6/
Registration (method II)	A.3.7.2.2.1	A.4.8.2.2			A & B	A & B	A & B	See 6/ and 7/
Chemical								
Resistance to solvents	A.3.7.3.2	A.4.8.3.2	8/	8/	8/	8/	8/	See 8/
Physical								
Bow and twist	A.3.7.4.1	A.4.8.4.1	PWB	PWB	PWB	PWB	PWB	Plan BH 9/
Conductor edge outgrowth	A.3.7.4.2	A.4.8.4.2	PWB	PWB	PWB	PWB	PWB	Plan BH
Plating adhesion	A.3.7.4.5	A.4.8.4.5	10/	C	C	C	C	Plan BH/TJ 3/
Solderability 8/ 11/								
Hole	A.3.7.4.7.1	A.4.8.4.7.1		A – S	A – S	A – S		See 8/ 12/
Surface	A.3.7.4.7.2	A.4.8.4.7.2	10/	C	C	C		Plan BH/TJ 8/ 11/
Solder resist cure and adhesion	A.3.7.4.8	A.4.8.4.8			G	G	G	Plan TJ
Thermal stress	A.3.7.4.10	A.4.8.4.10	B	B	A & B	A & B		See 6/
Electrical								
Continuity 13/	A.3.7.5.1	A.4.8.5.1			PWB	PWB		100 percent 13/
Circuit shorts 13/	A.3.7.5.2	A.4.8.5.2			PWB	PWB		100 percent 13/

1/ T1 designates a type 1 design; T2 designates a type 2 design; T3 designates a types 3 design; T4 designates a type 4 design and T5 designates a type 5 design; PWB means inspect the entire board, whereas an individual test coupon designation means inspect the specified test coupon. See appendix D herein for test coupon identification (name) translation to the applicable design standard.
2/ See appendix C, table VIII for C = 0 sampling plans and C.4.5 for examples.
3/ Some attributes may need to be inspected prior to lamination or solder resist application.
4/ The solder resist thickness verification can be performed on either test coupons using sample plan TJ or production printed wiring boards using sample plan BH, manufacturer's option.
5/ Test coupon or production printed wiring board, manufacturer’s option.
6/ See A.4.6.2.2 for sample size and test specimen description.
7/ Optional method by registration test coupons (method III), see A.4.8.2.2.2 for test specimen description and sample size.
8/ See A.4.8.3.2.1 for test specimen description and sample size.
9/ Rigidized sections or stiffener portions only.
10/ Test coupon “C” or production printed wiring board.
11/ For printed wiring boards using only surface mount lands for component attachment, the surface solderability test can be used in lieu of the hole solderability test.
12/ Test coupon “A” or “S”, manufacturers option.
13/ Types 3 and 4 printed wiring boards only. Note: It is assumed that both continuity and circuit shorts can be visually verified for types 1, 2 and 5. If continuity and circuit shorts cannot be verified using visual inspection, then the production PWBs shall be tested using a sample size in accordance with appendix C, table VIII, series H.

A.4.7 Periodic conformance inspection. Periodic conformance inspection shall consist of groups B and C inspection. Except where these inspections show noncompliance with the applicable requirements (see A.4.7.1.4), delivery of printed wiring boards which have passed in–process and group A inspection shall not be delayed pending the results of these periodic inspections. Periodic inspections shall be performed at a certified suitable laboratory (see A.6.6).

A.4.7.1 Group B inspection. Group B inspection shall consist of the inspections specified in table V.

A.4.7.1.1 Inspection lot. The sample units (test coupons) shall be randomly selected from the most complex (see A.6.4.2) inspection lot that has passed all in–process and group A inspections during that production month (i.e., the group B reporting period). The most complex printed wiring boards shall be as determined by the manufacturer using its definition of complex (see A.6.4.2), subject to approval by the qualifying activity.

A.4.7.1.2 Sampling procedures. Samples for each extent of qualification base material type family (see A.4.5.4.3) produced during that reporting period shall be subjected to group B inspection. Because of the performance nature of this document, the design details of the test coupons will need to be supplied with the sample units (see A.6.8).

A.4.7.1.2.1 Sample unit selection. Unless otherwise specified in A.4.8.3.2 (resistance to solvents) or 4.8.4.9 (surface peel strength), the following criteria shall be used in selecting samples for group B testing:

a. The sample units shall be randomly selected from panels that have passed group A inspection from the most complex (see A.6.4.2) printed wiring board design produced during that calendar month.

b. The sample units can be either:

(1) Two sets of quality conformance test circuitry, or

(2) Two test coupons for each test to be performed.

A.4.7.1.3 Frequency. The frequency of selecting sample units and performing group B testing shall be on a monthly basis. The sample units shall be submitted for testing within 30 calendar days after the end of each reporting period.

A.4.7.1.4 Failures. If one or more sample units fail to pass group B inspection, the sample shall be considered to have failed. The qualifying activity shall be notified of any group B failure within 3 business days. Group B inspection shall be repeated on additional sample units (either all group B inspections or just the group B inspection which the original sample failed, at the option of the qualifying activity) from the next most complex (see A.6.4.2) inspection lot from the same month that the failure occurred. Group A testing and shipment of the product represented by the failed group B sample shall be discontinued.

A.4.7.1.4.1 Corrective actions. Corrective actions shall be taken on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions (materials, processes, etc.), and which are considered subject to the same failure.